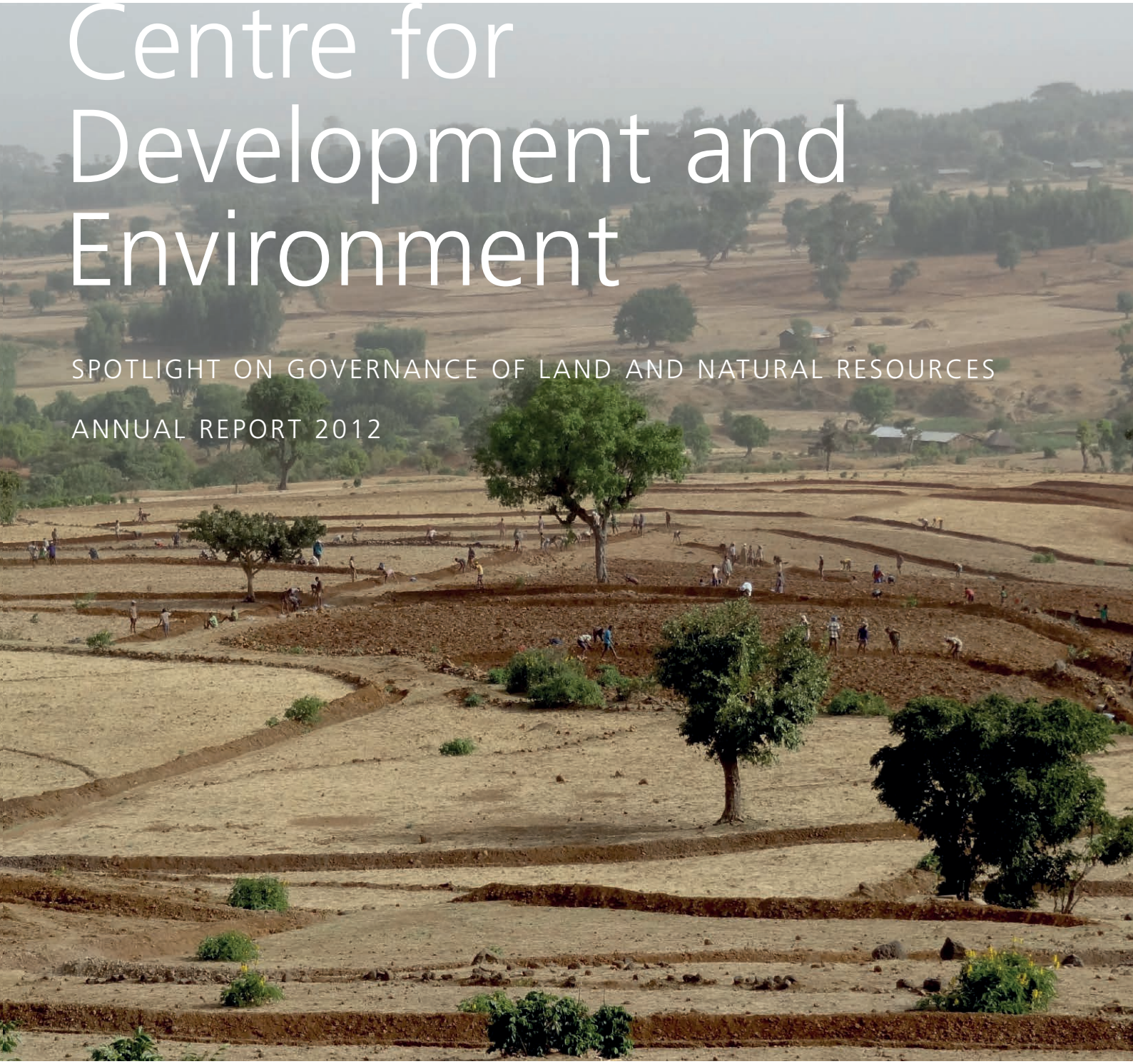
UNIVERSITÄT BERN

CDE
CENTRE FOR DEVELOPMENT AND ENVIRONMENT

Centre for Development and Environment

SPOTLIGHT ON GOVERNANCE OF LAND AND NATURAL RESOURCES

ANNUAL REPORT 2012



Publisher: Centre for Development and Environment (CDE)

Citation: Centre for Development and Environment (CDE). 2013. *Spotlight on Governance of Land and Natural Resources.* CDE Annual Report 2012. Bern, Switzerland: Centre for Development and Environment.

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Printing: Varicolor, Bern

Cover photo: In Ethiopia, CDE helped to make government-induced sustainable land management campaigns more acceptable to farming communities. Soil and water conservation has increasingly become part of their farming systems. Photo: Hans Hurni, CDE

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Foreword

Hans Hurni
President, CDE Board

A quick glance at the global map on pages 6 and 7 of this annual report is all it takes to appreciate how extensive CDE's work was in 2012. We were engaged in about 65 local partnership projects in Africa, Asia, South America, and Europe. In addition, CDE heads 19 global network projects from its offices in Bern.

Allow me to mention just a few examples of our projects. In East Africa, we studied the potential and the risks of biofuel production. In Ethiopia as well as in Tajikistan, we employed an innovative technology – soil spectroscopy – to measure the soil organic carbon content and overall quality of soils. In Laos, we examined social and economic data enabling insights into the distribution and concentration of poverty, and we developed an information platform for planners and decision-makers. In the Mediterranean, we refined tools to help farmers and experts choose the most sustainable methods of land use. And we created a world first: together with international partners, we developed a comprehensive website and published a report documenting large-scale land acquisitions in developing countries. In seeking answers we pay particular attention to land governance, that is, regulations and informal rules among various stakeholders such as farmers' associations, trade unions, investors, and politicians.

These examples highlight how CDE addresses issues that are crucial to sustainable development. In the pages of this annual report, you will learn more about how our approaches advanced last year.

Two conditions are instrumental for CDE to achieve results from the local to the global scale. First, CDE's established network of partnership institutions, most of them in the global South. These institutions are eager to share experiences and information, and willing to create new knowledge together. Second, our firm rooting at the University of Bern. The university is committed to its priority topic of "Coping with Global Change". To this end, it has designated CDE as its centre of excellence to pursue research and education for sustainable development as part of the university's overall mandate.

I wish you enjoyable reading.

Hans Hurni, President, CDE Board

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Advancing knowledge for sustainable development

Thomas Breu and Peter Messerli

Peter Messerli
Director CDE

Thomas Breu
Deputy Director CDE

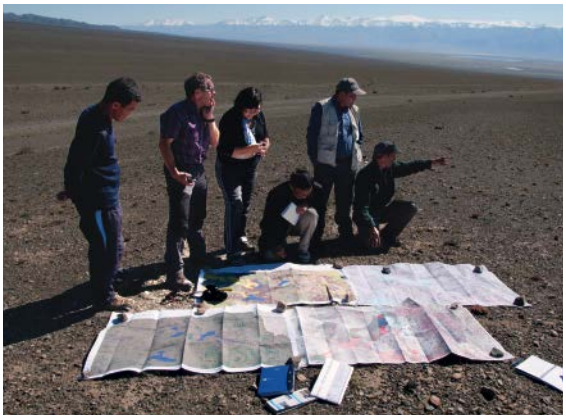
In June 2012, participants at the UN Conference on Sustainable Development, or "Rio+20", resolved to create a new "post-2015" agenda for development and sustainability. Rather than focusing solely on developing countries, this new agenda is also intended to place greater demands on industrialised countries. But defining and implementing sustainability objectives is extremely challenging, since different target areas such as the fight against poverty or reducing consumption of resources may compete or impact each other in unpredictable ways. Tackling these big challenges requires the help of the research community. As a university centre, CDE is dedicated to studying issues of sustainable development. Our strength lies in our ability to examine these issues directly in the field, together with our research partners and local populations in Asia, Africa, Latin America, and Europe, and in making our results available to broader society. A major overarching challenge is that of linking local research insights with supra-regional political, economic, and environmental developments, in order to contribute in a concrete way to achieving universal goals of sustainability. In its ongoing effort to make such a contribution, CDE once again led successful advancements in innovative research, capacity building, and societal engagement over the last year.

Sharpening CDE's research profile and generating new knowledge

In its role as a research centre, CDE must also meet institutional challenges, make adjustments, and continuously develop as an organisation. Various large research projects (for example the EU projects "DESIRE" and "Bioenergy in Africa and Central America") were successfully completed in 2012. We produced 31 peer-reviewed papers, over 40 other scientific and policy-oriented publications, and over 60 conference papers. At the same time, we acquired some very promising new research projects. A good example of successful project acquisition pertains to the recently launched National Research Programme 68, in which CDE will collaborate with the World Trade Institute and Agroscope to examine the sustainability of large-scale land acquisitions in the global South involving Swiss investors. Internally, CDE invested in the targeted development of each of its thematic clusters. The introduction of two professorships in sociology and biology affiliated with CDE will enable us to deepen our research expertise in societal issues and the natural sciences.

New courses of studies in sustainable development

On behalf of our commitment to promote sustainable development at the University of Bern, we have begun making preparations for expanded course offerings in this field. Starting in the fall semester of 2013, CDE will offer a new bachelor's-level minor and a Certificate of Advanced Studies (CAS) course in sustainable development. In addition, we are advising all university departments on how to integrate the topic of sustainable development into their courses of studies. Besides the new CDE professorships in sociology and biology,



CDE researchers and their Mongolian partners jointly validate satellite data on vegetation processes in Khovd, Mongolia. Hanspeter Liniger, CDE

our sustainability curriculum will be enriched by contributions from geography, social anthropology, and law. Last summer, we conducted the first Summer School of the International Graduate School (IGS) North-South, attended by 58 PhD students in Meiringen, Switzerland. The annual courses for PhD students from the North and the South are held in various countries and are jointly supported by the universities of Bern, Basel, and Zurich.

Fostering policy dialogue on global development issues

One of our key goals is to promote dialogue between science and society and to contribute to global debates on sustainability and development. For this reason, we once again organised various public events on development issues in 2012. Examples include events held in connection with the Rio+20 conference, the "green economy" debate, and the debate around the growing international trade of land. Finally, Prof. Dr. Hans Hurni attended the Rio+20 conference as an official member of the Swiss delegation designated by the Swiss Academies of Arts and Sciences.

Enhancing research partnerships and networks

Our aim is to conduct cutting-edge research for sustainable development and to help find solutions to pressing societal problems worldwide. Achievement of our ambitious goals would not be possible were it not for our diverse, long-running partnerships and networks at home and abroad. For this reason, we are making every effort to maintain and continuously expand these unique collaborations in research and development cooperation. Beyond our existing partnerships in the Horn of Africa and in East Africa, we further consolidated our partnerships in South America, Central Asia, Southeast Asia, and South Asia, and launched various research-based implementation projects.

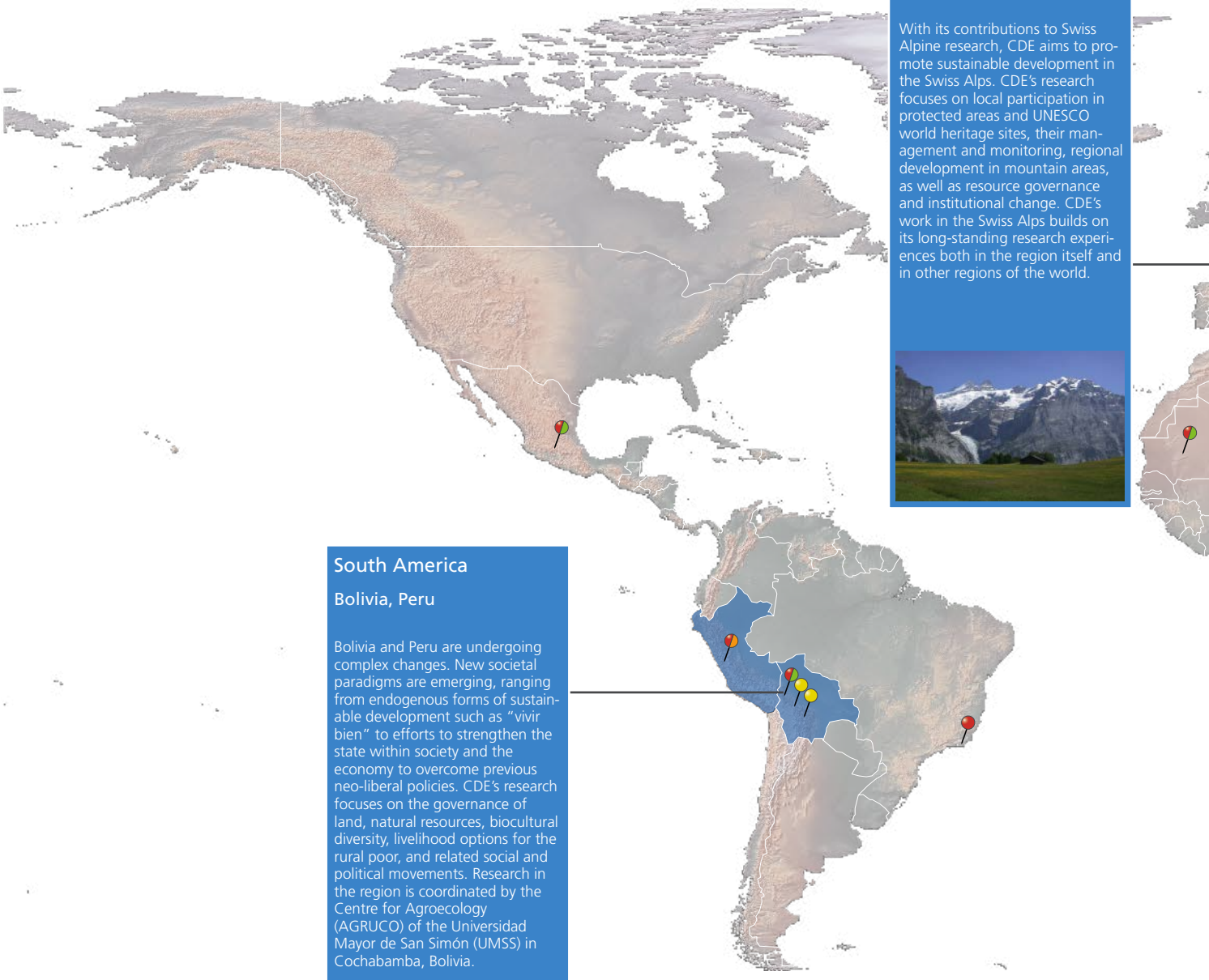
Building on proven success and exploring new frontiers

CDE experienced continued success in 2012. But it will require major efforts to maintain our current level of contribution to knowledge production on behalf of sustainable development. In line with its 2010–2015 strategy, CDE must further refine and expand its fields of expertise. In addition, CDE will take on further key responsibilities in association with its commitment to support education for sustainable development across the university. In collaboration with our partners at the University of Bern, throughout Switzerland, and internationally, we will undertake concerted acquisition efforts in research and implementation over the coming months, with the aim of maintaining our current third-party funding level of 80 per cent. We are confident that our efforts will be rewarded, allowing CDE to make a long-term contribution to implementation of the new global agenda for development and sustainability.

Programme work

Programme overview

CDE's portfolio includes national and regional programmes as well as global mandates. Funding comes from diverse sources. CDE's unique selling points are the diversity of the development contexts it covers worldwide; the link between research, training, outreach, and policy advice; and the long-term engagement that many of our programmes represent. This engagement is based on trusted partnerships with regional institutions and the people who work there, and with funding partners who are willing to support longer-term research and development activities.



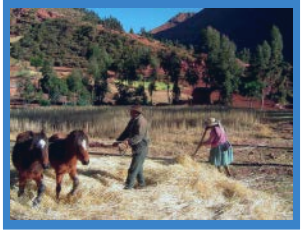
Swiss Alps

With its contributions to Swiss Alpine research, CDE aims to promote sustainable development in the Swiss Alps. CDE's research focuses on local participation in protected areas and UNESCO world heritage sites, their management and monitoring, regional development in mountain areas, as well as resource governance and institutional change. CDE's work in the Swiss Alps builds on its long-standing research experiences both in the region itself and in other regions of the world.

South America

Bolivia, Peru

Bolivia and Peru are undergoing complex changes. New societal paradigms are emerging, ranging from endogenous forms of sustainable development such as "vivir bien" to efforts to strengthen the state within society and the economy to overcome previous neo-liberal policies. CDE's research focuses on the governance of land, natural resources, biocultural diversity, livelihood options for the rural poor, and related social and political movements. Research in the region is coordinated by the Centre for Agroecology (AGRUCO) of the Universidad Mayor de San Simón (UMSS) in Cochabamba, Bolivia.

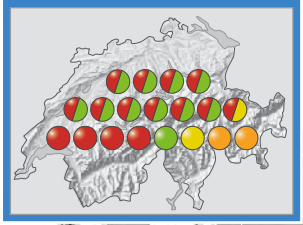


Funding partners

- Swiss Agency for Development and Cooperation
- Swiss National Science Foundation
- Other research funds
- Other international and national donors

Global networks hosted at CDE

Many of CDE's programmes and mandates have a global reach and are managed from our headquarters in Bern, Switzerland. The activities of these networks strengthen our established regional engagements, but also include other regions or cover specific development contexts worldwide. One example is WOCAT (World Overview of Conservation Approaches and Technologies). WOCAT is an established global network of soil and water conservation specialists, contributing to sustainable land management.



Horn of Africa

Ethiopia, Eritrea

People in the Horn of Africa face major challenges such as their high dependence on often degraded natural resources, extended periods of drought, ongoing conflicts, and post-conflict state-building. CDE's research and development activities cover land management, water governance, socio-economic issues as well as the development of methodologies in spatial information systems. CDE's work in Ethiopia is coordinated by the Regional Coordination Office in Addis Abeba, Ethiopia, which is also the official liaison office for Swiss–Ethiopian bilateral research activities and hosts the Water and Land Resource Centre.

Central Asia

Tajikistan, Kyrgyzstan

Central Asia, confronted with a combined water, energy, and food crisis, faces a number of challenges regarding political stability and social cohesion. CDE's research focuses on sustainable land management, integrated watershed management, monitoring of natural resources, and decision support for land use planning. Research is conducted in collaboration with the University of Central Asia in Bishkek, Kyrgyzstan, which hosts the NCCR North-South Regional Coordination Office, and with many other local partners.

Southeast Asia

Lao PDR, Vietnam, Cambodia

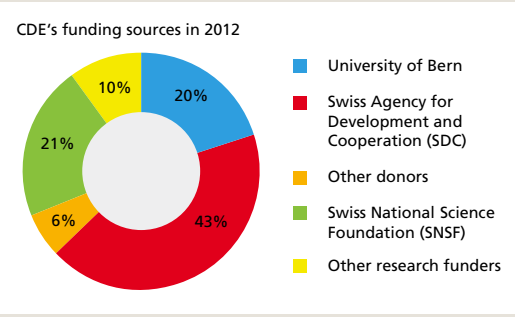
Southeast Asia is experiencing rapid change, triggered by economic reforms in the 1990s and global developments. New opportunities are emerging in the natural resource and farming sectors. Capacities for managing these transformations are urgently needed. CDE's research provides stakeholders with evidence and tools to support decision-making and guide development interventions. Research focuses on what is known as the lower Mekong region and is coordinated by CDE's liaison office in Vientiane, Lao PDR.

East Africa

Kenya, Tanzania, Mozambique, Madagascar

East Africa is highly susceptible to effects of climate change such as drought or flooding. CDE develops approaches and tools for coping with such weather extremes. Key topics of CDE's research in East Africa include sustainable management of natural resources, rural development, and poverty reduction. In Kenya, CDE's work is coordinated through CETRAD, a research and training institute based in Nanyuki. In Tanzania, Mozambique, and Madagascar, CDE works with various local partners.

Programmes and mandates in 2012



Shares of funding sources for CDE's activities and services in 2012.

Donor	Pledged funds (in CHF)
University of Bern[1]	3,227,800
Swiss Agency for Development and Cooperation (SDC)	6,758,250
Other donors	865,000
Swiss National Science Foundation (SNSF)	3,247,250
Other research funders	1,608,800
TOTAL	**15,707,100**

Sources of funding for CDE's activities and services in 2012, including entrusted funds.

Programmes and mandates by cluster (bold)	Funds (CHF)	Project type[2]	Main donors[3]	Countries/regions
Natural Resources and Ecosystem Services				
Sustainable Land Management in Mountain Regions	11,300	Research project (C)	SNIS	Bolivia, Nepal
DESIRE – Desertification Mitigation and Remediation of Land	15,000	Research project (C)	EU-FP7	Mediterranean Basin
CASCADE – Catastrophic Shifts in Drylands	40,000	Research project (C)	EU-FP7	Mediterranean Basin
Advisory Services on Geoinformation Systems	200,000	Outreach/Policy (C)	SDC	Mongolia
Impacts of Reducing Emissions from Deforestation and Forest Degradation and Enhancing Carbon Stocks (I-REDD+)	50,000	Research project (C)	EU-FP7	China, Indonesia, Laos, Vietnam
NCCR North-South Research Project on Land Resource Potentials	195,000	Research project (A)	SNSF, SDC	Ethiopia, Kenya, Tajikistan
NCCR North-South Special Research Project on Water	50,000	Research project (B)	SNSF, SDC	Global
Sustainable Land Management Programme	30,000	Outreach/Policy (C)	Syngenta Foundation	Eritrea
World Overview of Conservation Approaches and Technologies (WOCAT)	500,000	Outreach/Policy (C)	SDC, others	Global
Multidimensional Disparities				
Lao DECIDE Info	500,000	Outreach/Policy (C)	SDC	Laos
NCCR North-South Research Project on Access and Welfare	267,500	Research project (A)	SNSF, SDC	Kenya, Laos, Mauritania, Tanzania, Vietnam
NCCR North-South Research Project on Adaptation to Climate Change	100,000	Research project (A)	SNSF, SDC, others	Côte d'Ivoire, Kenya, Pakistan, Swiss Alps
NCCR North-South Special Research Project on Climate	50,000	Research project (B)	SNSF, SDC	Global
NCCR North-South Special Research Project on Food	50,000	Research project (B)	SNSF, SDC	Global
NCCR North-South Special Research Project on MDGs	25,000	Research project (B)	SNSF, SDC	Global
Ambizione – Resilient Agriculture-based Livelihoods: Adaptation to Climate Change in Africa	100,000	Research project (A)	SNSF	East Africa
Joint Research Project on Landless Pastoralists	86,000	Research project (B)	SNSF, SDC	Pakistan
Governance of Land and Natural Resources				
Capacity Building for Environmental Impact Assessment	20,000	Outreach/Policy (C)	FOEN	Azerbaijan, Central Asia
NRP61 – MontanAqua	70,000	Research project (B)	SNSF	Swiss Alps
NCCR North-South Research Project on Rural Transformation	127,500	Research project (A)	SNSF, SDC	Bolivia, Mexico
Environment and Security in Water Management	50,000	Outreach/Policy (C)	FDFA	Georgia, Azerbaijan

Governance of Forest Multiple Outcomes in the Bolivian Lowlands (GOFORBO)	106,000	Research project (B)	SNIS	Bolivia
Swiss Alpine Research	145,000	Research project (B)	UNESCO World Heritage	Swiss Alps
Water and Land Resource Centre	1,000,000	Outreach/Policy (B)	SDC	Ethiopia, Kenya, Tanzania
Global Change Impacts				
Backstopping Mandate on Environment and Development	150,000	Outreach/Policy (C)	SDC	Global
Disaster Risk Management	30,000	Outreach/Policy (C)	SDC	Tajikistan
Land Observatory	485,000	Outreach/Policy (C)	SDC, ILC	Laos, Cambodia, Tanzania, Madagascar, Peru
Development of Nature Conservation and Protected Areas in the Carpathians	50,000	Outreach/Policy (C)	SDC/Swiss Enlargement Contribution	Slovakia
Mountain Research and Development (MRD) International Scientific Journal	200,000	Outreach/Policy (B)	CDE, ICIMOD, IMS, SDC, others	Global
NCCR North-South Research Project on Landscape Transformation	215,000	Research project (A)	SNSF, SDC	Ethiopia, Kenya, Laos
NCCR North-South Special Research Project on Land	125,000	Research project (B)	SNSF, SDC	Global
NCCR North-South Thematic Node 3 Core Activities	100,000	Research project (A)	SNSF, SDC	Global
Mountain Development After Rio+20	75,000	Outreach/Policy (C)	SDC	Global
Large-scale Land Acquisitions in Southeast Asia	51,000	Research project (C)	SNIS	Cambodia, Laos
Innovations in Sustainable Development				
Eastern and Southern Africa Partnership Programme (ESAPP)	1,100,000	Outreach/Policy (B)	SDC	East Africa, Horn of Africa, Madagascar
Bioenergy in Africa and Central America (BIA)	125,000	Outreach/Policy (C)	EU-ERA-ARD	Ethiopia, Kenya, Tanzania
Transforming Tanzania's Charcoal Sector	55,000	Outreach/Policy (C)	SDC	Tanzania
House Insulation and Efficient Stoves to Reduce CO_2 Emissions	110,000	Outreach/Policy (C)	REPIC	Kyrgyzstan
Biofuel Production: Spatial Impacts and Normative Powers	100,000	Research project (A)	SNSF	Global, Ethiopia, Tanzania
The Agrobiodiversity Initiative (TABI)	270,000	Outreach/Policy (C)	SDC	Laos
Education for Sustainable Development				
Training Course on Climate Change	50,000	Outreach/Policy (C)	SDC	Switzerland (venue), Global (topics)
Various teaching mandates, e.g. Zurich University of Applied Sciences, NADEL/ETH Zurich, University of Lucerne	20,000	Outreach/Policy (C)	Mandating institutions	Switzerland (venue), Global (topics)
SCOPES – Geoprocessing for Natural Resource Monitoring: Capacity Strengthening	120,000	Research project (C)	SNSF	Tajikistan
Services Unit				
Various books, brochures, editing of publications	20,000	Outreach/Policy (B)	Mandating projects	
Support for Rio+20	40,000	Outreach/Policy (C)	SDC	Brazil (venue), Switzerland
NCCR North-South Partnership Regions (JACS)	900,000	Research project (B)	SNSF, SDC	Global
NCCR North-South Management Centre	1,000,000	Research project (B)	SNSF, SDC	Global
NCCR North-South Thematic Nodes 1 and 2	1,800,000	Research project (B)	SNSF, SDC	Global
NCCR North-South Thematic Nodes 3 and 4	1,500,000	Research project (B)	SNSF, SDC	Global
University Funds				
University Funds[1]	3,227,800		University of Bern	
Overall Total[4]	**15,707,100**			

[1] Funds from the University of Bern, paid to the Centre for Development and Environment (CDE), the Department of Integrative Geography (DIG), and the International Graduate School (IGS) North-South in compensation for research, services in teaching and supervision, and general university functions

[2] Project types: A = Projects of the Department of Integrative Geography (DIG) that are of strategic interest to CDE; B = Projects led jointly by CDE and the Department of Integrative Geography, in terms of both strategic guidance and content; C = CDE projects of strategic interest to the Department of Integrative Geography

[3] Acronyms: SNIS = Swiss Network for International Studies; EU-FP7 = European Union Seventh Framework Programme; SDC = Swiss Agency for Development and Cooperation; SNSF = Swiss National Science Foundation; IFAD = International Fund for Agricultural Development; FOEN = Swiss Federal Office for the Environment; FDFA = Federal Department of Foreign Affairs; UNESCO = United Nations Educational, Scientific and Cultural Organization; UNESCO World Heritage = UNESCO World Heritage Swiss Alps Jungfrau-Aletsch; ILC = International Land Coalition; CDE = Centre for Development and Environment; ICIMOD = International Centre for Integrated Mountain Development; IMS = International Mountain Society; EU-ERA-ARD = European Union, European Research Area, Agricultural Research for Development; REPIC = Swiss Interdepartmental Platform for Renewable Energy and Energy Efficiency Promotion in International Cooperation

[4] Includes entrusted funds amounting to CHF 8,442,700

Programme highlights

Jatropha plant with fruit in Bati, Ethiopia. Photo: Simon Bach, CDE

Potential and limits of jatropha cultivation

The seeds of the jatropha plant contain around 30 per cent of high-quality oil that is suitable as a replacement for diesel, but also for direct burning in oil lamps or to fuel stationary engines for electricity production. High hopes were placed in this multifunctional plant in Africa, as it grows in dry and nutrient-poor soils. But did jatropha live up to these expectations?

CDE examined the risks and potentials of jatropha production together with partners from Europe, Africa, and Central America as part of the European Union's "Biofuels in Africa" project. In November 2012, researchers presented the results of this three-year project in Kenya, confirming suspicions that small-scale cultivation of jatropha is a risky venture for local farmers. For one, it is hardly profitable; for another, it competes with local food crops.

Nonetheless, examples show that jatropha does have the potential to contribute to sustainable rural development in East Africa. To capture the benefits while minimising the risks, CDE recommends planting jatropha in hedges bordering fields. This form of jatropha cultivation meets three requirements at once: the plants form a barrier that protects field crops from animals, the seeds provide farmers with lamp oil for home use, and competition with food crops is avoided. But additional research is needed to determine whether this model makes economic sense for small-scale farmers.

A further potential of jatropha lies in stabilising erosion gullies. Instead of investing considerable labour in building stone walls to protect the ground from erosion, farmers can plant dense rows of jatropha across gullies. These living barriers hold back surface run-off and let the water seep into the ground, where it provides much-needed moisture.

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Soil spectral measurements in a field near Faizabad, Tajikistan. Photo: Bettina Wolfgramm, CDE

Measuring soil quality using spectroscopy

In Central Asia and the Horn of Africa, soils are exposed to intensive use and extreme climatic conditions. An aim of sustainable agriculture in these regions is to increase the organic matter content of soils. A heightened level of soil organic matter content helps to conserve nutrients and water, and protects the soil from erosion due to its stable structure. As soil organic matter is composed of about 60 per cent organic carbon, it plays an important role in carbon sequestration, and can contribute to reducing carbon dioxide in the atmosphere.

To measure soil organic content, CDE researchers within the Swiss National Centre of Competence in Research (NCCR) North-South introduced a new method in Tajikistan and Ethiopia: soil spectroscopy. A team of local and Swiss researchers used a spectroscope to measure the light reflected from soil samples, and compared the findings with the results of conventional chemical soil analyses. This made it possible to characterise different soil types and to build up local libraries for predicting specific soil properties such as soil organic carbon, making spectroscopic measurement data available to local scientists and land users as a reference for future measurements.

The method immediately found favour in Ethiopia. Within a year, local soil scientists had built up large libraries with data in various parts of Ethiopia. In Tajikistan, CDE researchers together with local soil scientists established a large spectral library despite difficulties related to the withdrawal of Soviet support two decades ago. The consequences of this withdrawal are still felt today, for example in that state-run soil institutes lack adequate reference data and measurement instruments.

In the context of sustainable land use, soil spectroscopy offers a promising method of measuring soil quality. It is inexpensive, environmentally friendly, quick, and enables long-term monitoring of the organic matter content of soils for improved conservation of soils.

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Three steps to countering desertification

Measuring soil moisture using time domain reflectometers in Morocco. Photo: Hanspeter Liniger, CDE

About 40 per cent of the Earth's total land area is affected by desertification. Overgrazing, deforestation, intensive agriculture, unsuitable irrigation, as well as droughts and floods contribute to soil erosion and salinisation. This leads to crop and vegetation loss on farmland and pastureland. In many areas, people are unaware of approaches and specific measures to combat growing desertification. Within the European Union's DESIRE project, 26 research institutes joined forces with local populations to analyse the problem of land degradation and identify sustainable forms of land use. Emphasis was placed on local people's needs. What types of land use best enhance soil moisture and fertility, keep costs down, and sustain jobs?

To help researchers and farmers choose suitable land use methods, CDE developed an approach based on three steps: identifying existing proven land use methods as well as new ideas, assessing these using standardised questionnaires, and selecting the most sustainable among them with respect to local requirements. The approach uses standardised questionnaires developed by CDE and partners for the World Overview of Conservation Approaches and Technologies (WOCAT) – a network that promotes worldwide sharing of sustainable land management techniques. Successful examples from the DESIRE project were integrated into WOCAT's online database, where they can be accessed by other land users, experts, and researchers around the world looking to counter desertification. Local participants in DESIRE also profited from the WOCAT database: they analysed examples from around the world and assessed them according to their own local criteria. Certain practices used in Tajikistan, for instance, showed promise for sustainable application in Portugal.

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A research agenda for sustainable development

The 3rd International Conference on Research for Development (ICRD 2012) brought together around 350 researchers and practitioners from the global North and South. Photo: Peter Mosimann

Climate change, desertification, and water shortages are among the most critical global environmental changes. They are accelerated by rapid population growth and an increasing demand for energy and resources, and their impacts are greatest in poor countries. To advance research for global sustainable development, around 350 researchers and experts from developing and industrialised countries gathered at the International Conference on Research for Development (ICRD) 2012 in Bern, organised by the Swiss National Centre of Competence in Research (NCCR) North-South.

A highlight of ICRD 2012 was the presentation of a research agenda, developed by CDE researchers together with the NCCR North-South network. The agenda is intended as a guide for researchers to identify future research questions in relation to global change, generate knowledge, and make this knowledge accessible to society and policymakers. In discussions on the research agenda draft, conference participants agreed that capacity development, both in the global North and South, should be the primary goal of research. This requires strong partnerships between research institutions from industrialised and developing countries, as well as cooperation beyond the disciplines and with development practitioners. The research agenda is currently being finalised and prepared for publication in a journal.

The research agenda draft can be accessed here: *www.icrd.ch*

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Mutual learning and the search for sustainable solutions

Excursion to the Grimsel hydropower plant during the IGS North-South's Summer School in 2012. Photo: Barbara Vollenwyder, CDE

In August 2012, the International Graduate School (IGS) North-South held its first official Summer School. Around 70 PhD students and lecturers from Africa, Asia, America, and Europe came together in Meiringen, Switzerland, to study issues of "livelihoods, institutions, and conflicts" using real-world examples. Thus, students analysed a conflict between tourism associations and the Swiss Air Force involving a military airbase in Meiringen, as well as a conflict between conservation groups and energy advocates over a dam wall for the Grimsel hydropower plant. The goal was to develop research questions based on local conflicts, together with the people affected on the ground and students from various disciplines. According to the IGS North-South, it is precisely this kind of approach that will enable researchers to help identify sustainable solutions to local problems.

Students singled out the field excursions and on-site discussions with stakeholders as the highlights of the event. From the perspective of the course instructors, the biggest challenges were tailoring lessons to students with differing education levels, and overcoming language barriers.

The IGS North-South is a collaborative initiative of the universities of Bern, Basel, and Zurich. It was established in 2009 within the framework of the Swiss National Centre of Competence in Research (NCCR) North-South. CDE coordinates the IGS North-South's annual Summer School. Courses for PhD students from the global North and South

are held in various countries, illuminating issues of global change and sustainable development through investigation of concrete, local cases.

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Farmers demonstrate sustainable land use methods in videos

Farmer Iskandar from Tajikistan shares his experience in grafting apple trees in a WOCAT video. Photo: Hanspeter Liniger, CDE

Sustainable land management can help to boost soil health and thus improve the quality of life. The World Overview of Conservation Approaches and Technologies (WOCAT) network collects knowledge about sustainable land management to spread good practices globally. The knowledge is documented in the WOCAT database and presented in an illustrated format, either online or in print. In addition, the WOCAT team has now produced short video clips to disseminate information about these practices in an easily understandable way and via social media.

In the videos, farmers from Tajikistan and Kenya describe and demonstrate their sustainable land use methods. One farmer, Iskandar, reports on his knowledge about grafting apple trees in a way that guarantees him income even in years with difficult weather conditions; another, Momakhol, talks about her experience with energy-efficient stoves and how she uses them to minimise soil degradation. The videos met with great interest among the local population. Some recognised the places, others the farmers on the screen, and they understood the language of the film. This encouraged animated discussions among the population. They exchanged experiences and discussed the practices shown in the WOCAT documentaries. Some even showed slight consternation at not having been able to show their own land management practices in a film. Given the films' success, production will continue. The goal is to introduce the videos in different regions and to provide precise explanations of land use methods. The videos help experts and the local population to judge the results of sustainable land management, together with the information available in print. CDE, which hosts the WOCAT secretariat, coordinates production of the videos.

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Photo: Urs Wiesmann, CDE

Spotlight: Governance of Land and Natural Resources

Selected features of CDE's programme work

The benefits of economic growth are constantly undermined by its ecological and socio-economic costs. These costs are expressed in increasing degradation and depletion of land, soils, water, and biological diversity, as well as in growing social disparities. Related greenhouse gas emissions are changing the atmosphere, threatening – for the first time in history – the entire biosphere; the impacts are accentuating existing socio-economic inequalities. Uncovering sociopolitical processes that fuel trends of unsustainable development is the core concern of CDE's Governance of Land and Natural Resources cluster. Understanding the factors behind the depletion of land and natural resources and promising innovative reactions to it helps us to find ways of changing existing governance regimes in line with the principles of sustainability.

Elections and referendums at local and national levels turned into a key element of current change in Bolivia. Massive participation of indigenous women plays a crucial role in ensuring overall high levels of participation. Photo: José Luis Quintana for Agencia Boliviana de Información

Why governance?

The concept of governance recognises that problems of global change cannot be adequately understood and addressed by only examining the direct links between government and other actors involved in using land and natural resources. In spite of impressive progress in the formulation of environmental policies at national and international levels, forests, healthy soils, and clean water are rapidly diminishing. To counter this, we must seek to understand the rules, processes, and structures through which state actors coexist and interact with diverse civil society stakeholders. Such stakeholders include farmers' organisations, indigenous nations, local to global elites, national and transnational companies, political parties, and even actors engaged in illegal logging, large-scale land acquisition, or mining.

Sustainable governance of land and natural resources

The cluster defines sustainable governance of land and natural resources as the *"rules, processes, and structures through which a society takes decisions on how to use land and natural resources, taking account of the regenerative capacities of biophysical processes and striving for the achievement of basic human rights".*

Working in sustainable governance of land and natural resources means tackling the following conceptual, methodological, and policy challenges:

- **Finding out how complex cross-scale and multi-actor agreements, such as trade agreements or investment treaties, affect the human rights of local populations and existing international legal obligations towards the environment.**
  This may be done through ex-ante sustainability impact assessments of international policies. The example of the European Union's ex-ante

"Marcha Eco Solidaria": women taking to the streets of La Paz, Bolivia, to show their support for fair trade. Photo: Isabelle Hillenkamp

assessments of trade agreements shows that sustainability impact assessments could be strengthened by integrating a coherent human rights perspective.

- **Reconciling "one size for all" policies favoured at the global level, such as REDD+, with the extremely high diversity of land and forest governance regimes found at local to national levels.**
  Insights from research in the Bolivian Amazon show that this requires a reworking of global policy instruments through participatory, top-down, and bottom-up negotiation processes between local, national, and global actors.

- **Identifying local innovations for more sustainable resource management and finding adequate national policy measures to promote them.**
  In Kenya, locally developed harvest protocols have enabled the regeneration of indigenous plant species and their certification in premium markets. Also, the previously informal production of camel milk has become a legally recognised traditional form of using natural resources.

- **Building platforms that link policymakers and silenced stakeholders whose needs and voices are not heard due to historically grown marginalisation and exclusion.**
  The example of landless mobile pastoralists in Pakistan demonstrates how such initiatives can lead to the development of more inclusive, and hence democratic, governance of land and natural resources.

- **Ensuring that the adaptation of existing governance regimes to climate change expresses the future needs and visions of development of all affected stakeholder groups.**
  A transdisciplinary endeavour to develop visions for sustainable development and climate change adaptation in the Canton of Valais, Switzerland, gives insights into how to advance more reflexive and deliberative resource governance.

- **Increasing transparency and accountability, and filling information gaps in controversies over the sustainability of resource governance.**
  CDE and a coalition of international organisations use "crowdsourcing" to investigate the global phenomenon of large-scale land acquisition, demonstrating how governance processes can become more democratic and reflexive by generating knowledge in and for the public realm, through an interactive web portal.

Using concrete examples from research, the following chapters illustrate the manifold aspects of sustainable governance of land and natural resources.

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Sustainable international regulations for sustainable development

In the complex landscape of trade and investment regulations, ensuring coherence in their design is crucial. Sustainability impact assessments are a way of preventing conflicting impacts by different treaties. However, a number of methodological flaws remain. CDE and the University of Bern's World Trade Institute (WTI) have been examining these and outlining ways to eliminate them.

Encounter between local traders and global commodity chains in the port of Tanga, Tanzania. Photo: Urs Wiesmann, CDE

Trade and investments play a key role in global economic development. Depending on the rules they follow, they have favourable or adverse effects on local economic development, the environment, and the distribution of wealth. Whether or not, for example, investments in land resources in Kenya benefit the local population and preserve the environment has much to do with trade and investment regulations. It also depends on whether Northern agribusiness companies investing in Kenya are embedded in a sustainable regulatory framework, whether local land rights are effectively protected, and whether procedures follow the rule of law.

Coherence through sustainability impact assessments

Increasing globalisation is leading to increasingly complex relationships between states, regions, and business enterprises. Regulating these relations is largely the domain of international law: this includes not only international economic law (covering trade, investment, financial, and tax agreements), but also international human rights law and international environmental law.

Given this growing complexity, how can all these international agreements be designed in a coherent way? This question not only concerns the avoidance of formal contradictions – which arise, for example, when an environmental treaty bans trade in a specific chemical, while a trade agreement prohibits such a ban. Obvious contradictions of this kind are rare and can usually be remediated by introducing exemption clauses in the relevant treaties. The issue at stake is much more complex: the question is whether different treaties counteract each other in terms of their impacts. One way of clarifying this question is by carrying out sustainability impact assessments before an agreement is concluded – so-called ex-ante sustainability impact assessments. The European Union, for example, assesses the sustainability impacts of each of its trade agreements before concluding them. This practice, which Switzerland has not yet adopted, is a first step in the direction of sustainable trade agreements, although many methodological issues remain to be resolved. In a recent study for the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), a CDE/WTI researcher pointed out a number of methodological flaws in the European Union's sustainability impact assessments and outlined how they could be eliminated by incorporating human

Camel train transporting *khat* in the Ethiopian Highlands. The chewing drug is destined for the international market. Photo: Brigitte Porter, CDE

rights standards into the methodology. The proposed solution draws on the *Guiding Principles on Human Rights Impact Assessments* developed by United Nations Special Rapporteur on the Right to Food Olivier de Schutter and a group of experts including the CDE/WTI researcher.

Research across disciplines

CDE and WTI are now refining the existing methodology for sustainability impact assessments and applying it to concrete cases. CDE contributes its broad local empirical expertise to the endeavour, while WTI builds the bridge to relevant legal and economic fields of inquiry. More specifically, CDE will collaborate with WTI and Agroscope to examine the sustainability of Swiss large-scale land acquisitions in poor countries – a project within the Swiss National Science Foundation's newly launched National Research Programme 68. The project will develop a method for analysing the local and global economic, legal, social, and environmental impacts of land investments and weighing them up against each other. This analysis will make it possible to identify regulatory gaps in both the home state and the host state of an investment and to develop suggestions for reform. In this context, the project will link up to ongoing debates about corporate responsibility, which gained fresh impetus in Switzerland, as elsewhere, with the launch of the *Guiding Principles on Business and Human Rights* by United Nations Special Representative on Business and Human Rights John Ruggie.

The complexity of these issues shows that advances in research for sustainable development are only possible if researchers from different disciplines join forces and work together. Looking at the legal and institutional framework of investments in land, for example, is just as important as examining their impacts on the local people and environment. By combining various scientific disciplines and working with WTI and other partners, CDE offers a promising approach to assessing the sustainability of regulations and monitoring it in the long term.

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Sustainable forest governance in the Bolivian Amazon: prospects for REDD+

While the need to protect forests is uncontested, how this should be done is under debate. A mechanism developed by the international community – REDD+ – aims at creating a global fund to compensate communities for economic losses they suffer if they stop deforestation. But the scheme leaves many questions open, such as its implications for people's livelihoods and biodiversity conservation. CDE and its partners sought answers to these questions and found that shifting the focus of REDD+ would be beneficial.

Villager in the Pilón Lajas biosphere reserve, Bolivia, responding to a survey on farm and off-farm incomes. Photo: Patrick Bottazzi, CDE

Carbon emissions from deforestation and forest degradation account for about 17 per cent of global carbon release. To curb these emissions, the international community has developed an incentive mechanism for Reducing Emissions from Deforestation and Forest Degradation (REDD+). REDD+ aims to support community forestry, in which various stakeholders including community members and non-governmental organisations play an important role in forest management. Community forestry is gaining in significance in efforts to promote carbon sequestration, especially in developing countries. Under the REDD+ scheme, a global fund would compensate communities for economic losses they suffer if they stop cutting their forest for planting crops or grazing livestock. Contracts with community members would stipulate compensation rates as well as the conditions under which payment can be made.

Although the need to protect forests is uncontested, opinions diverge on how this should be done. Critics warn that focusing exclusively on carbon sequestration will threaten the livelihoods of people who depend on other forest functions such as producing timber or medicinal plants. It also remains unclear how REDD+ can be adapted to the vast diversity of local forest governance systems and their implications for people's livelihoods, biodiversity conservation, and forest communities' development options. Whether REDD+ compensations will benefit all community members equally, favour existing elites, or even help to create new ones is another unanswered question.

Calculating opportunity costs

CDE and several Swiss and Bolivian partners sought to generate empirical evidence regarding these and other open questions. They carried out 12 case studies evaluating the trade-offs between local livelihoods, biodiversity conservation, and carbon sequestration, under highly diverse local forest governance regimes. The project was financed by the Swiss Network of International Studies (SNIS) and, along with CDE, involved the Centre for Agroecology (AGRUCO) of the University of Coch-

In focus group discussions with villagers in the Pilón Lajas biosphere reserve, Bolivia, researchers learned more about local institutions and current forest management practices. Photo: Patrick Bottazzi, CDE

abamba and the Centro de Estudios de la Realidad Económica y Social (CERES) in Cochabamba, Bolivia, as well as the International Forestry Resources and Institutions (IFRI) research network, the School of Natural Resources and Environment (SNRE) of the University of Michigan in the USA, and the United Nations Environment Programme (UNEP) in Geneva, Switzerland.

First we calculated current forest outcomes, that is, the financial value of all forest uses including non-timber forest products, agriculture following slash-and-burn, and carbon sequestration. On this basis, we estimated how much a potential REDD+ project would have to pay local people to offset their loss of livelihood benefits if they are forbidden to cut their forests. This loss is also referred to as opportunity costs. We found that opportunity costs are 2–3 times higher in secondary forests, which were previously cleared and then left to regrow, than in old-growth or primary forests, which had never before been cleared. This calls for selective and flexible policies that help to maintain and improve agriculture in secondary forests while offering compensation for the conservation and sustainable management of old-growth forests.

Our studies also showed that in areas where people rely more on agriculture than on forestry, financial compensation to reduce deforestation in old-growth forests could be cost-effective and might even help farmers to intensify their production and develop sustainable soil management practices.

By contrast, in communities that depend more heavily on forestry, compensation of opportunity costs would not adequately mitigate deforestation and forest degradation. The reason is the lack of employment alternatives: families would be left without work, unable to ensure their food security.

Shifting REDD+ towards more sustainable forest management

The research conducted by CDE and its partners leads to the conclusion that instead of expelling labour from community forestry and putting food security at risk, REDD+ projects should focus on paying for the additional labour required to establish more sustainable forest management. This would help to improve communities' professional capacities, self-governance, knowledge-sharing, and the management and marketing of non-timber forest products – but without compromising biodiversity conservation or income and food security. The need to shift the focus of REDD+ from output values such as carbon sequestration to managing inputs into sustainable forest governance is an important lesson from our research that should be taken up by policymakers.

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Supporting the sustainable governance of indigenous produce

In areas where natural resources are scarce and contested, effective governance at various levels – local, regional, and national – is a key factor in minimising environmental destruction and conflict. Helping to establish sustainable governance of natural resources is what CDE has tried to do during its long-term presence in Kenya. Most recently, this has included support for pastoralist communities in developing protocols for harvesting gum arabic and frankincense, and facilitating policy dialogue to encourage the legal trade in camel milk.

CDE and its local partners are helping pastoralist communities in Kenya to establish protocols for sustainable harvesting of gum arabic and frankincense. Photo: Centre for Development and Environment (CDE)

Rainfall and water availability are scarce in the middle and especially the lower stretches of the Ewaso Ng'iro river basin northwest of Mount Kenya. This marginal, semi-arid area has also seen heavy immigration from overpopulated high-potential regions, increasing pressure on its natural resources and leading to conflicts over access to land and water. Forests, wetlands, and pastures have been subjected to severe destruction. Research conducted by CDE and its partners in the region has shown that natural resource management and governance at the local, regional, and national levels are key factors in helping to solve these pressing problems. Lack of effective governance can lead to environmental destruction and conflicts between different user groups.

The approach taken by CDE and its partners

CDE and its partners have been active in the Mount Kenya region for over three decades and have contributed to strengthening sustainable governance of natural resources at various levels of government. At the local level, CDE has implemented projects to establish local governance bodies – for example user groups – and local regulations for access to different natural resources. Further, it is now testing context-specific harvesting and processing protocols. Once approved, they will provide an important basis for negotiating binding agreements on access to, and the use of, natural resources. Such agreements can be established between members of one community, between different communities that depend on the same natural resources, or between national or regional institutions and local communities. At the national level, CDE has implemented projects to help provide an adequate national policy framework to these local governance bodies. A crucial aspect is for regional and national governments to recognise and support local resource user groups or village authorities as partners in all matters related to local governance of natural resources.

Protecting the trees that yield gum arabic and frankincense

Gum arabic and frankincense have been harvested for generations in northern Kenya and exported via informal market routes into the Middle and Far East to be sold on international markets. Both products are derived from tree resin; gum arabic is used for

Integrated into the national dairy policy: legally traded camel milk in one of the leading supermarket chains in Kenya. Photo: Boniface Kiteme, CETRAD

a broad range of industrial and commercial applications, mainly as a stabiliser (food additive E414) and adhesive, while frankincense is used to produce incense and perfumes. So far, harvesting has taken place without proper planning; the need for trees to regenerate has gone largely unconsidered, and protocols for the protection of trees are inexistent. This has accelerated the degradation of rangeland vegetation and put some of the targeted indigenous species under threat, leading to production of poor quality gum and resins which cannot compete in the highly selective international market. To make matters worse, the same high-value indigenous species that produce gum arabic and frankincense have also been extensively used for charcoal production. CDE and its local partners are working to remediate this situation by helping pastoralist communities in the lower stretches of the Ewaso Ng'iro basin to establish protocols for harvesting gum arabic and frankincense. More specifically, we are developing a methodology for regulating and certifying sustainable wild harvesting of these indigenous gums and resins. First, researchers inventory and map resources together with the local communities. This includes assessing growth parameters, stocking density, tree distribution, and potential production within the region. Then local people and researchers jointly establish a practical methodology for sustainable harvesting, focusing on harvesting techniques and on securing the natural regeneration of trees. Finally, we work with the authorities to develop harvesting and processing protocols. The aim is to help optimise production levels and economic returns, ensure that the quality of gums and resins meets international certification standards, and achieve sustainability. Integrated quality certification mechanisms will help communities to access premium national and international markets and improve their livelihoods and food security situation.

Enabling the legal trade in camel milk

Pastoral communities in the lower stretches of the Ewaso Ng'iro basin also rely on camels for their livelihoods. Until a few years ago, camel milk was produced and sold through informal channels, especially to the Somali community residing in Nairobi and other cities. This trade was considered illegal, as the Kenya Bureau of Standards had never issued any quality standards for camel milk. CDE and its partners decided to address this unsatisfactory situation by facilitating a national-level policy dialogue. The initiative was successful: as a result, the Ministry of Livestock and Fisheries Development integrated camel milk production and trade into its dairy policy. This new policy framework enables local pastoral communities to legally trade camel milk. Producers can obtain better prices and a higher volume of trade by opening new marketing channels. A challenge that remains is to ensure that the new policy framework effectively translates into improved conditions for herders on the ground.

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Sustaining mobile pastoralists in the mountains of northern Pakistan

For centuries, *Ajars* – landless mobile pastoralists – have produced milk, meat, and wool, provided manure, and maintained biodiversity in the fragile mountain areas of northern Pakistan. They form a population of about 50,000. Although their livestock production accounts for only 11 per cent of the province's agricultural gross domestic product, their achievements in terms of stewardship of a delicate ecosystem are invaluable. But until now this has largely gone unnoticed. CDE and its partners in Pakistan have analysed the reasons for the *Ajars*' marginalisation, and put forth potential solutions.

An *Ajar* herder and his animals on the move towards upland pastures on a busy road in Balakot, Pakistan. Photo: Henri Rueff, CDE

The livelihoods of the 7400 *Ajar* families are precarious for a combination of reasons. These include a lack of facilities such as water, sheds, and hay at market places, reducing these herders' possibilities to stay longer and seek better prices for their livestock products. In addition, two factors hinder them from moving freely with their herds. First, farmers who have shifted from staple food to cash crops increasingly prevent herds from crossing their fields to feed on stubble. Second, tree plantations promoted by government and foreign aid agencies' campaigns obstruct the pastoralists' transhumance routes. With fewer feeding alternatives, herders accelerate their pace and reach upland pastures earlier in the summer. Their animals graze on sprouting grasses, accentuating the stress on pastures. Pressure on natural resources is worsened by the fact that landowners prefer to rent their land to pastoralists who now crop rather than herd, since they can afford higher rents. In the absence of terraces, the resulting spread of crops and tilling to ever steeper slopes is exacerbating soil degradation.

Understanding the dynamics of pastoralist livelihoods

CDE and the Foundation for Research and Socio-Ecological Harmony (FRESH) based in Islamabad, Pakistan, analysed physical, social, and institutional drivers of landless pastoralists' marginalisation, and explored potential solutions. We found that indigenous livestock breeds perform better than high-input/high-output imported breeds in this harsh and rugged mountain terrain where the quality of fodder is poor and its scarcity is additionally aggravated by climate change. Land degradation due to crop encroachment in this alpine context occurs faster than elsewhere, as soil washes away more easily on steep slopes and high-altitude tilled pastures are particularly sensitive to stress. Large-scale monoculture afforestation to counter land degradation obstructs transhumance and increases social tensions over resources. Planting diverse fodder trees might relax these tensions: suitable tree species could provide fodder for transhumant livestock while simultaneously stabilising slopes. However, landless herders continue to be marginalised due to society's

An *Ajar* herder on an upland pasture in Kalam, Swat valley, Pakistan. Photo: Wajid Rashid, Foundation for Research and Socio-Ecological Harmony, Pakistan.

lack of awareness of the economic contribution that they provide. Missing governance structures and a lack of policy coherence between different political institutions hinder their development.

From analysis to political action: commitments for the herding communities

Our project addressed this situation by initiating a dialogue between *Ajars*, landowners, and various government authorities. A workshop in Islamabad in April 2012 provided the first occasion for stakeholders to meet, voice their interests, and address institutional deficiencies affecting landless mobile pastoralists in Pakistan. Three initiatives emerged from the workshop. First, the Secretary of Agriculture made a commitment to revise agricultural policies at the province level in order to include pastoralists' interests. Community-based organisations among the *Ajar* will be supported, and the pastoralist agenda will be advocated within the provincial government. Second, a research cluster on pasture studies was created at the University of Peshawar's Department of Environmental Sciences. The University also agreed to admit 25 children of landless pastoralists to its schools from kindergarten to secondary level, waiving tuition fees and accommodation charges. The third initiative, proposed by the Provincial Department of Livestock and Dairy Development, stipulates the creation of a Pastoralism Unit to prepare a health and support services agenda for landless mobile pastoralists and to implement relevant measures.

The government has allocated 150 million Rupees (USD 1.6 million) to a pastoralist programme for the next 3 years (2013–2016). The programme includes the purchase of land to establish resting places on transhumance routes, a conservation programme for indigenous livestock breeds, and the redirection of afforestation campaigns from pine monoculture to fodder tree plantations.

Further research for development: addressing disparities

Our research highlights how global change can exacerbate disparities by focusing on one of Pakistan's most disadvantaged groups. In addition to building awareness in society, the project achieved commitments to improve governance structures. The research team emphasised that changes in the pastoral system profoundly impact on the division of labour within households and are experienced very differently by household members. Future research initiatives thus need to address dynamics within households, particularly with regard to gender relations. Further, comparative studies of nomadic herding communities in neighbouring countries and other regions of the globe could provide key insights into ways to improve the governance of land and natural resources in the context of fragile ecosystems, transhumance, and precarious livelihoods.

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MontanAqua: visions for sustainable water management

Switzerland with its abundant water supplies is sometimes called the "water tower of Europe". And yet, some areas – in particular, south-facing slopes – regularly experience water shortages. Developing a coherent water management strategy is key, and requires the participation of a wide range of stakeholders with differing demands for water. To this end, an interdisciplinary research team from the universities of Bern, Fribourg, and Lausanne worked with local stakeholders in the Swiss Alps to develop a joint vision of a sustainable future in their region.

In the study region of Crans-Montana-Sierre, CDE researchers together with local stakeholders developed sustainable water management visions for the future. Photo: Katrin Simonett

The dry year of 2003 alerted many Swiss water users to how water scarcity can affect us also in Switzerland. Farmers had to stop irrigating their fields, river navigation was limited, and fish died in masses due to the rise in water temperature. In light of climate change and ongoing socio-economic developments we have to assume that such drought-related problems in Switzerland will worsen in the future. They will particularly affect areas that regularly experience water shortages already today, such as the villages on the south-facing slopes of the Valais.

Water management in Crans-Montana-Sierre

How can we organise water management so that it enables us to deal with these problems more successfully in the future? CDE investigated this question together with a research team from the universities of Bern, Fribourg, and Lausanne. For the first time, the issue was addressed combining the perspectives of different natural and social sciences and involving local stakeholders. We examined how water management is organised in the study region of Crans-Montana-Sierre and, together with local stakeholders, developed sustainable water management strategies for the future that take account of climate change and scenarios of regional development.

The greatest share of water flows into hydropower production

In the study region of Crans-Montana-Sierre, people use water for a broad variety of purposes, and these uses are developing dynamically. Based on a systematic analysis of current water uses, we showed that the greatest portion of water by far is used to produce hydropower. Large shares of water are also used as drinking water and to irrigate farmland, especially vineyards and livestock pastures. By comparison, the amount of water used for tourism – for example for snowmaking or to irrigate golf courses – is fairly marginal. Although water is abundant in the high alpine zones upstream, the

Part of the Crans-Montana-Sierre region, in which researchers addressed water management issues with local stakeholders. The tourist resort of Crans-Montana has many reservoirs, but it also has many water users. These range from hydropower producers to farmers, but also include resort operators needing to irrigate golf courses or make snow for the ski slopes. Photo: Swiss Air Force

area around the villages on the south-facing slopes is very dry, and water shortages have repeatedly caused problems and conflicts. Interviews with locals revealed that they had no shared vision of a sustainable future for the region.

A shared vision: better infrastructure and reduced water use

A shared vision based on local people's various demands for water, however, is a key element of sustainable water management: it enables stakeholders to set priorities and develop coherent strategies for action. This is why researchers of CDE got together with a group of local stakeholders to develop visions for the future of the entire study region. The stakeholder group included representatives of the 12 local municipalities, of the various water users – hydropower producers, farmers, winemakers, tourist enterprises, and conservationists – and of the region's existing water management organisations. We worked together over several meetings to develop visions for the future. The local stakeholders had trouble agreeing on a shared vision, as their views and interests differed substantially. But in the end stakeholders and researchers succeeded in developing three different visions as well as a shared vision based on consensus within the stakeholder group.

Strikingly, the shared vision is directed not only towards increasing water supply by improving infrastructure, but also towards optimising and reducing water consumption. At the same time, it outlines a regional development that guarantees a high quality of life for coming generations, for example by ensuring continued employment opportunities in tourism, conserving the landscape, and maintaining the region's spectacular traditional water channels as a cultural heritage. The participating stakeholders also came to realise that water management needs to be organised at the regional level. But they were unable to agree on the need for revising water rights – a prerequisite for reorganising water management. Today, some municipalities have very far-reaching water rights, while others have practically none.

Water use scenarios for the future

Researchers are now working to translate the visions into water use scenarios. Will there be enough water in the future to realise the local stakeholders' visions? Will the planned measures suffice to reduce water shortage problems in the future? The results of these analyses will again be discussed with the local stakeholders next year. The aim is to jointly develop viable and sustainable solutions.

This example highlights how important it is for researchers to work together with local actors when dealing with issues of sustainability. It also shows that developing a shared vision for the future together with different water users is a demanding task, but has great potential for leading to more sustainable solutions.

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Crowdsourcing: fostering transparency and equitable decision-making in the governance of large-scale land acquisitions

Large-scale land acquisition by public and private investors is on the rise in poor countries. Hailed by some as a way of modernising food production and increasing exports, "land grabbing" has spawned controversy as critics counter that human rights are violated and livelihoods put at risk. Data on large land deals remain sparse, making it difficult for policymakers to respond appropriately. Now, an international consortium of which CDE is part has organised a public data collection campaign. The campaign is based on a crowdsourcing approach, sharing efforts among a potentially large number of actors.

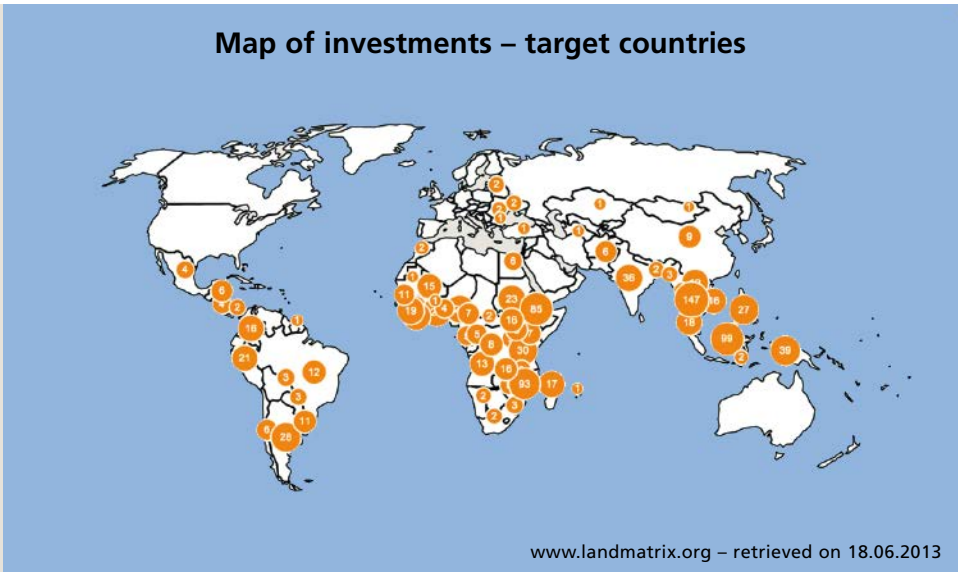
CDE and its partners use crowdsourcing to identify land deals. Here, a local researcher is collecting data on land deals in Laos. Photo: Centre for Development and Environment (CDE)

New communication technologies are having huge impacts on societies in the global South and North. Even in the poorest countries, mobile phones and internet access are spreading rapidly. Many view this as an opportunity to counterbalance existing power asymmetries regarding access to information, its generation, and its interpretation. How such new technologies can improve the democratic governance of information is shown by the example of a web-based crowdsourcing tool developed by CDE and other partners.

Public data collection for more transparency

The financial crisis of 2008 prompted private and public investors to rapidly increase their efforts to lease or buy large areas of land in poor countries. While investors emphasised the positive effects of such land deals in terms of modernising food production and generating export revenues, critics pointed out severe adverse impacts on human rights, food security, and the livelihood options of thousands of indigenous and peasant communities. In the resulting controversy over what became known as "land grabbing", highly incomplete and often contradictory data on the extent of the phenomenon became a major issue. Neither policymakers nor scientists were able to provide urgently needed verifiable data.

For this reason, CDE and the International Land Coalition (ILC), Oxfam Novib, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the German Institute of Global and Area Studies (GIGA), and CIRAD (Centre de coopération internationale en recherche agronomique pour le développement) organised a public data collection campaign, called the "Land Matrix". In a first effort to apply a crowdsourcing approach, existing information was systematised through internet research and made public. Concerned stakeholders began to react, helping us to update and improve the quality of data. We received responses from governments, investors, and civil society, sometimes confirming or completing our data, sometimes criticising them as outdated or exaggerated. We have observed that, increasingly, investors are making data regarding



Crowdsourcing initiatives can encourage and support citizens in recording and maintaining information about land deals. Figure: www.landmatrix.org

land deals public on their websites. Likewise, a number of governments have started to publicise their agreed deals and the corresponding contracts in the internet.

Comprehensive analysis needed

Analysis of existing data showed that processes of land acquisition are often obscured and secretive as they evolve through the stages of announcements, letters of intent, negotiations of deals, and finally signature of a contract – or cancellation and failure of deals. Agricultural projects on the land acquired are often implemented in stages as well, starting on a limited scale and gradually expanding across the entire area before finally launching production. Sometimes nothing at all happens on the land: this can be the case if a deal was purely speculative or if the investors failed to raise the capital needed. In light of this complexity, there is an urgent need not only for collecting data on the size and number of deals signed, investors and regulators involved, and peasants and herders affected, but also for comprehensive analysis of these data to support a more transparent debate and, eventually, more democratic governance of large-scale land acquisitions.

Data collection through crowdsourcing

In an effort to meet this challenge, CDE and ILC started a pilot project called the Land Observatory, covering Laos, Cambodia, Tanzania, Madagascar, and Peru. A pilot web platform will help to collect, visualise, and analyse data on land deals using a crowdsourcing approach. This means systematically involving local partners in the endeavour, sharing and multiplying efforts among a potentially large number of actors – "the crowd". Crowdsourcing is widespread in business, but has also been applied in disaster relief, where activist campaigns have supported humanitarian aid in Haiti, Sudan, and elsewhere, by rapidly collecting information about people's needs with the help of a crowd of volunteer activists. In the realm of development, crowdsourcing is seen as a means to democratise the generation and interpretation of data and make these processes more transparent and effective. The approach aims at greater accountability, but also at enhancing the quality of information via the "insight of the crowds".

Many crowdsourcing efforts build on mobile applications. The Land Observatory may develop such solutions at a later stage; for the moment, other ways of data sharing – through the web and traditional channels such as phone lines and personal communication – remain the primary solution. In discussions with our partners, the predominant concern was to introduce a moderation function to deal with often sensitive and contradictory data. We have to acknowledge that the issue of land acquisition is highly politicised and has the potential to spark conflicts. A tool like the Land Observatory needs to be built up step by step if we are to support a true dialogue among all stakeholders and, eventually, more equitable decision-making.

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www.landobservatory.org
www.landmatrix.org

The regional coordination office in Kenya

CETRAD's mission is to assess the potential and utilisation of arid and semi-arid lands, to empower local communities, and, by disseminating information, to enable them to participate effectively in the development of arid and semi-arid lands. Photo: Fred Grimm

The Centre for Training and Integrated Research in Arid and Semi-Arid Lands Development – CETRAD in short – is based on a bilateral agreement between the governments of Kenya and Switzerland. Cooperation runs through Kenya's Ministry of Environment, Water and Natural Resources and, in Switzerland, through CDE and the Swiss Agency for Development and Cooperation. CETRAD was established in 2002 to institutionalise the successful cooperation that had evolved between these partners during the Laikipia Research Programme from 1976 to 1997. This innovative programme was devoted to investigating and promoting sustainable use and management of natural resources such as water, soil, and vegetation in the arid and semi-arid lands of Laikipia and the upper Ewaso Ng'iro basin. Among other things, researchers helped to develop and support strategies for self-reliance among small-scale farmers and pastoralists.

Capacity building for sustainable development in arid and semi-arid lands

Located in Nanyuki, CETRAD builds on long-standing research facilities established during the Laikipia Research Programme and has been mandated to build capacity for sustainable development in arid and semi-arid lands through research, training, and technology transfer. Current fields of research include natural resource management and governance, payment for environmental services, climate change, rural livelihoods, food security, access to services and natural resources, renewable energy, and regional development dynamics. CETRAD's activities are funded by the government of Kenya (10%), the Swiss Agency for Development and Cooperation (10%), and from project funds that are sourced competitively through different organisations (80%).

Training and field courses for students

CETRAD offers short-term training courses and provides a platform for academic training programmes to impart technical skills and provide field-based practical training to their target trainees, mostly people working for government institutions or NGOs. Over the past ten years, more than 500 participants have gained skills in various fields such as integrated water resource management or food security and drought management. Academic training programmes are offered at the Master's, PhD, and post-doc levels and are financed through collaborative research programmes between various institutions worldwide. Examples include the European Union's "Bioenergy in Africa" project or the Volkswagen Foundation's project on semi-arid areas in transition.

Long-standing collaboration with CDE

Collaboration between CETRAD and CDE has intensified over the past 15 years, mainly thanks to two long-term collaborative research programmes: the NCCR North-South and the Eastern and Southern Africa Partnership Programme (ESAPP). These programmes were built around North–South and South–South research partnerships and offered invaluable opportunities for institutional collaboration and networking both across continents and within the region.

CETRAD's director (to the right) explaining to former Swiss Federal Councillor Moritz Leuenberger one of the farm-based, simple but effective methods to protect crops and households against elephant raids: the white cloth in the foreground is stained with dried and ground hot pepper, which keeps away elephants. Photo: CETRAD

In addition to collaboration between researchers from the global North and South and from different disciplines, both programmes also emphasised the role of non-scientific actors in research for sustainable development. The NCCR North-South's Partnership Actions to Mitigate Syndromes of Global Change (PAMS) – a special programme component for applying and validating research innovations together with non-scientific actors – was key in strengthening transdisciplinary research for sustainable development between scientists and non-scientific actors. The experiences gained within this unique research framework provided some of the most important lessons learnt during this period of collaboration with CDE.

Top-level research for resolving societal issues

CETRAD seeks to engage in top-level research while contributing to the resolution of urgent societal issues, for example in the fields of urban planning and conflict mitigation. The following two examples illustrate some of CETRAD's research activities.

Participatory mapping for more efficient urban planning

A successful example of a transdisciplinary research endeavour is the Nakuru Local Urban Observatory, developed by a PhD student of CDE within the NCCR North-South to investigate potentials, limitations, and risks of geo-information technologies for sustainable development in Kenya. Data collected during participatory mapping with inhabitants of Nakuru were fed into a comprehensive spatial database and made available to the local authorities in a toolkit known as NakInfo. This stimulated the development of municipal spatial and environmental planning and management practices based on accurate, timely, and easily accessible information. The toolkit was eventually taken up by the Association of Local Government Authorities of Kenya (ALGAK) and applied in other municipalities across the country. At the national level, the project contributed to the Local Authority Service Delivery Action Planning process and triggered the establishment of municipal observatories that fed into UN-HABITAT's Global Urban Observatory. The project team won an award for humanitarian contributions in computer sciences conferred by the Association for Computing Machinery (ACM) based in the United States of America.

Mitigating conflicts between people and elephants

Synergies between CETRAD, the NCCR North-South, ESAPP, and other associated research initiatives led to successful interventions to mitigate conflicts between people and elephants in the Ewaso Ng'iro basin. The approach was adopted in other areas and has come to influence participatory conservation planning and decision-making processes throughout East Africa. Funded by ESAPP and coordinated by CETRAD, the project capitalised on the results of a PhD study funded by the University of Cambridge, United Kingdom, and an NCCR North-South Master's study. To begin with, communities affected by elephant raids were trained in monitoring and reporting incidents to the relevant authorities. At the same time, researchers analysed the spatial dynamics of the conflicts. These initial steps helped to create awareness, strengthen links between communities and authorities, and identify main predictor variables in order to better target fur-

CETRAD analyses strategies of sustainable development and promotes land use planning as a means to improve local farmers' livelihoods. Photo: Fred Grimm

ther interventions. An educational film was created to sensitise East African wildlife managers and policymakers and familiarise them with tools to minimise conflicts and promote peaceful coexistence; home-grown farm-based strategies for communities living with elephants in the Ewaso Ng'iro region were collected and made available in a comic book. A follow-up intervention is now providing local people with tools to participate still more effectively in human–wildlife conflict management and conservation planning: community scouts are being trained in using a mobile-phone-based system for reporting incidents, as well as a web-based mapping platform that enables real-time viewing of this information and the movement of radio-collared elephants. These new tools were developed in the Laikipia area and are being tested there, with a view to eventually applying them across all of East Africa.

A strong position on the global map of institutions doing research for sustainable development

Thanks to its long-standing collaboration with CDE, CETRAD has developed over the years into an institution renowned for advancing knowledge-based development interventions and development-oriented research in East Africa and particularly in Kenya and Tanzania. As such, it has become an invaluable asset for CDE as well as other partners. It has emerged as an important entry point and platform for regional development initiatives and as a regional reference for global programmes. These will continue to provide the framework for future collaboration. Looking back, partnership with CDE and other associated partners has enabled CETRAD to grow into a strong institution and gain international recognition in the field of research for sustainable development.

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Photo: Rodney Garrard, CDE

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Rist S, Nuñez del Prado J. 2012. The MDGs in Bolivia: Poverty reduction in a post-neoliberal area. NCCR North-South Dialogue 43. Bern, Switzerland. 47 pp.

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Photo: Hanspeter Liniger, CDE

Personnel*

Board Members, CDE	
Name	**Professional background**
Hurni, Hans (President)	Prof., geographer
Wiesmann, Urs	Prof., geographer
Znoj, Heinzpeter	Prof., social anthropologist
Directors, CDE	
Name	**Professional background**
Messerli, Peter (Director)	PhD, geographer (100%)
Breu, Thomas (Deputy Director)	PhD, geographer (100%)
Executive Committee	
Name	**Professional background**
Balsiger, Urs	MBA, economist (80%)
Kohler, Thomas	PhD, geographer (80%)
plus CDE Directors (see above)	
Heads of Cluster	
Name	**Professional background**
Bieri, Sabin	PhD, geographer (70%)
Ehrensperger, Albrecht	PhD, geographer (90%)
Giger, Markus	MSc, agro-economist (90%)
Herweg, Karl	PhD, geographer (100%)
Rist, Stephan	PD, agronomist (95%)
Schwilch, Gudrun	PhD, geographer (60%)
Programme Staff	
Name	**Professional background**
Bachmann, Felicitas	MA, anthropologist (70%)
Bottazzi, Patrick	PhD, international development studies (30%)
Bürgi Bonanomi, Elisabeth	Attorney at Law (50%)
Eckert, Sandra	PhD, GIS/RS specialist (80%)
Engesser, Matthias	MSc, geographer (80%)
Epprecht, Michael	PhD, geographer (100%)
Fries, Matthias	MSc, geographer (80%)
Gambon, Helen	MA, anthropologist and PhD candidate (100%)
Gämperli Krauer, Ulla	MSc, geographer (25%)
Garrard, Rodney	MSc, geographer and PhD candidate (100%)
Gerber, Kurt	MSc, GIS/IT specialist (80%)
Heinimann, Andreas	PhD, environmental scientist (100%)
Hergarten, Christian	MSc, GIS/IT specialist and PhD candidate (100%)
Hett, Cornelia	PhD, geographer (50%)
Hoeggel, Udo	MSc, eco-agronomist (100%)
Hurni, Kaspar	MSc, geographer and PhD candidate (100%)
Ifejika Speranza, Chinwe	PhD, geographer (100%)
Jaquet, Stephanie	MSc, environmental scientist and PhD candidate (100%)
Jucker, Matteo	MSc, environmental scientist and PhD candidate (100%)
Kläy, Andreas	MSc, forest engineer (80%)
Krauer, Jürg	MSc, GIS/IT specialist (100%)
Lemann, Tatenda	MSc, geographer and PhD candidate (100%)
Liechti, Karina	PhD, geographer (50%)

Liniger, Hanspeter	PhD, geographer (100%)
Lörcher, Sylvia	MSc, geographer (25%)
Mathez-Stiefel, Sarah-Lan	PhD, ethnobotanist (40%)
Meessen, Heino	PhD, landscape ecologist (60%)
Mekdaschi, Rima	PhD, agronomist (40%)
Michel, Claudia	PhD, geographer (50%)
Ott, Cordula	MA, anthropologist and PhD candidate (100%)
Portner, Brigitte	MSc, geographer and PhD candidate (100%)
Providoli, Isabelle	PhD, geographer (80%)
Roth, Vincent	MSc, geographer and PhD candidate (100%)
Rueff, Henri	PhD, economist (35%)
Salmi, Annika	MA, sociologist and PhD candidate (100%)
Schäfer, Nathalie	MSc, geographer (80%)
Schneider, Flurina	PhD, geographer (15%)
Schönweger, Oliver	MSc, PhD candidate (100%)
Vonlanthen, Lukas	MSc, earth scientist (80%)
Weber, Adrian	MSc, geographer (80%)
Wolfgramm, Bettina	PhD, environmental engineer (100%)
Wymann von Dach, Susanne	MSc, geographer (50%)
Zähringer, Julie	MSc, environmental economist and PhD candidate (100%)
Zimmermann, Anne	PhD, language scientist and editor (100%)
Services Unit Staff	
Name	**Fields of activity**
Achermann, Sarah	Research assistant (80%)
Alder, Simon	Research assistant (80%)
Balsiger, Nicole	Financial administrator (30%)
Bamert, Seraina	Research assistant (25%)
Fedail, Ahmed	Web project manager (50%)
Gehrig, Roger	Research assistant (25%)
Heierle, Emmanuel	IT coordinator (80%)
Hirschbühl, Tina	Language editor and translator (40%)
Hodel, Elias	Research assistant (25%)
Jöhr, Franziska	Secretary (80%)
Kummer, Simone	Graphic designer (70%)
Lannen, Anu	Language editor and translator (50%)
Lardelli, Corina	Communications specialist (60%)
Lauterburg, Nina	Research assistant (25%)
Motzer, Yvonne	Librarian (15%)
Nussbaumer, Melchior	Research assistant (50%)
Paulsson, Maria	Research assistant (25%)
Schotte, Sarah-Kay	Research assistant (25%)
Thibault, Marlène	Language editor and translator (100%)
Trechsel, Lilian	Research assistant (50%)
Tresch, Jeannine	Secretary and IT specialist (60%)
Vollenwyder, Barbara	Managerial assistant (80%)
Willi, Barbara	Administrative assistant (50%)

*Status on 31 December 2012

CDE's PhD students at the International Graduate School (IGS) North-South in 2012*

Name	Working title of thesis	Funded by	Start of PhD	End of PhD
Anarbekov, Oyture	Irrigation management transfer: Questions of sustainability of Water Users Associations (WUAs) in Ferghana Valley	International Water Management Institute (IWMI); CDE; United Nations Economic Commission for Europe (UNECE)	2012	2015
Asnake, Mekuriaw	Assessment of the dynamics of soil and water conservation measures and land use change in the highlands of Ethiopia using remote sensing and GIS	Swiss National Centre of Competence in Research (NCCR) North-South	2010	2013
Bikketi, Edward	The role of social capital in social learning processes for soil and water management innovations: The case of Western and Eastern Kenya	Volkswagen Foundation; Swiss Government Excellence Scholarships for Foreign Scholars (FCS)	2010	2013
Conradin, Katharina	World heritage sites and sustainable regional development	Self-funding; with support from UNESCO World Heritage Site Swiss Alps Jungfrau-Aletsch and NCCR North-South	2011	2014
Faye, Papa	Managing the forest by the people: Constitutionality, citizenship and representation in two decentralisation initiatives in Senegal's forestry sector	CDE; Institute of Social Anthropology, University of Bern	2011	2014
Gambon, Helen	Constitutionality processes and social-ecological outcomes in an indigenous territory in the Bolivian lowlands	Swiss National Science Foundation (SNSF); Doctoral Programme (ProDoc)	2012	2015
Garrard, Rodney	Landscape dynamics in Sagarmatha (Mount Everest) National Park, Nepal: Impacts on selected environmental services and adaptive capacities	Commission for Research Partnerships with Developing Countries (KFPE); CDE; European Outdoor Conservation Association	2009	2013
Hergarten, Christian	Integrated assessment of land use systems' ecosystem services at the regional scale	NCCR North-South	2009	2013
Hurni, Kaspar	Spatial characterisation of land use patterns and land transformation processes in Lao PDR	NCCR North-South	2009	2013
Jacobi, Johanna	The contribution of organic farming to farmers' and ecosystem resilience in a changing climate: A comparison of different cacao cultivation systems in Alto Beni, Bolivia	Avina Foundation; Commission for Research Partnerships with Developing Countries (KFPE); NCCR North-South	2010	2013
Jaquet, Stéphanie	Sustainable Land Management in mountain regions of Bolivia and Nepal in the context of outmigration, climate change and disaster risk reduction	Swiss Network for International Studies (SNIS)	2012	2014
Jucker, Matteo	The role of land management in preventing catastrophic shifts of dryland ecosystems	Catastrophic shifts in drylands: how can we prevent ecosystem degradation? (CASCADE)	2012	2015

Kassawmar, Tibebu	Landscape transformation in Ethiopia: Spatio-temporal dynamics and implications on transboundary runoff and sediment yield in the Blue Nile Basin, Ethiopia	NCCR North-South; CDE	2012	2015
Lemann, Tatenda	The dynamics of "blue" and "green" water uses in the upper Blue Nile Basin in Ethiopia: Towards improved decision-making and transboundary negotiations	NCCR North-South; CDE	2012	2015
Nazarmavloev, Farrukh	A soil spectroscopy library and its application for assessing soil fertility in agricultural lands of Tajikistan	Swiss Government Excellence Scholarships for Foreign Scholars (FCS)		
Portner, Brigitte	Spatial impacts of biofuel crop production	Swiss National Science Foundation (SNSF); Doctoral Programme (ProDoc)	2009	2013
Primasari, Nova	Dynamics of land use and stakes in Indonesia's peat lands and their impact on environmental services and local livelihoods: The case of Riau Province, Indonesia	Self-funding	2011	2014
Roth, Vincent	Discharge and erosion modelling in the upper Blue Nile basin: Towards improved decision-making and transboundary negotiations	NCCR North-South; CDE	2012	2015
Schönweger, Oliver	Key factors and processes shaping the implementation of large-scale land acquisitions	Swiss Network for International Studies (SNIS)	2012	2015
Shabdolov, Alisher	Improved governance of rangeland in the western Pamirs: Implications for common property management of scarce pasture resources in mountain regions	Swiss Government Excellence Scholarships for Foreign Scholars (FCS); University of Central Asia's Mountain Societies Research Centre (UCA/MSRC)	2012	2015
Tadele, Amare	Assessing the long-term impact of soil terracing on carbon sequestration in the highlands of Ethiopia	NCCR North-South	2010	2013
Thanichanon, Puwadej	Effects of market integration on land use and welfare in Xayaburi Province, Lao PDR	NCCR North-South	2009	2013
Vergara, Cristian	Implementation of the REDD+ scheme in the Pilón Lajas biosphere reserve, Bolivia: An evaluation based on a social multi-criteria framework	Swiss National Science Foundation (SNSF); Doctoral Programme (ProDoc); self-funding	2012	2015
Zähringer, Julie	Cross-scale landscape service trade-offs in a conservation–development nexus along the northeastern escarpment of Madagascar	CDE	2012	2015

*Includes IGS North-South students enrolled at the University of Bern and/or engaged in preparatory work for their PhDs at CDE in 2012; in addition, the NCCR North-South Management Centre at CDE supported another 80 PhD students within the NCCR North-South

Finances

Financial account for 2012 (in CHF / rounded)

INCOME	CHF	CDE	DIG (Department of Integrative Geography)[1]
External funds			
Programme income	4,179,600	4,179,600	
Other income (services)	-143,000	-143,000	
Total external funds	*4,036,600*	*4,036,600*	
University funds			
Contribution to office rent[2]	200,000	100,000	100,000
Contribution to personnel expenditure	2,423,000	1,293,900	1,129,100
Contribution to operating expenses	604,800	525,700	79,100
Total university funds	*3,227,800*	*1,919,600*	*1,308,200*
Total income	**7,264,400**	**5,956,200**	**1,308,200**
EXPENDITURE			
Personnel			
Salaries	5,095,000	4,167,200	927,800
Social benefits	1,105,700	904,400	201,300
Total personnel	*6,200,700*	*5,071,600*	*1,129,100*
Other expenditure			
Office rent	220,800	120,800	100,000
Office operating expenses	264,100	191,000	73,100
Travel	112,500	106,500	6,000
Miscellaneous	81,400	81,400	0
IT (CDE share)	182,200	182,200	0
Total other expenditure	*861,000*	*681,900*	*179,100*
Accruals	**202,700**	**202,700**	
Total expenditure	**7,264,400**	**5,956,200**	**1,308,200**

All accounts were audited externally and internally and were unconditionally approved

[1] The financial account of DIG is listed here, as due to the many jointly run projects and programmes its accounting is done by CDE

[2] Paid directly by the University administration

Balance sheet as at 31 December 2012 (in CHF / rounded)

ASSETS	
Current assets	
Liquid funds, CDE[1]	3,950,300
Liquid funds, programmes	0
Accounts, university	706,500
Accounts receivable[2]	-1,486,800
Total current assets	*3,170,000*
Fixed assets	
EDP equipment	42,000
Furniture	4,500
Total fixed assets	*46,500*
Total assets	**3,216,500**
LIABILITIES	
Current liabilities	
Accounts payable	135,300
Total current liabilities	*135,300*
Equity capital	
Capital[3]	699,300
General reserves[4]	1,069,500
Tied reserves[5]	1,048,200
Accounts received in advance	264,200
Total equity capital	*3,081,200*
TOTAL LIABILITIES	**3,216,500**

[1] This includes considerable advance payments from donors for large programmes
[2] Liquid funds were transferred to project and programme accounts only in early 2013
[3] Equity capital at date of establishment of CDE as an interdisciplinary research centre in mid-2009
[4] Accumulated gains and losses from previous years
[5] Reserved for severance payments and special research

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